

# Design considerations in developing a gamified grammar application

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# Definition of terms: Game based learning

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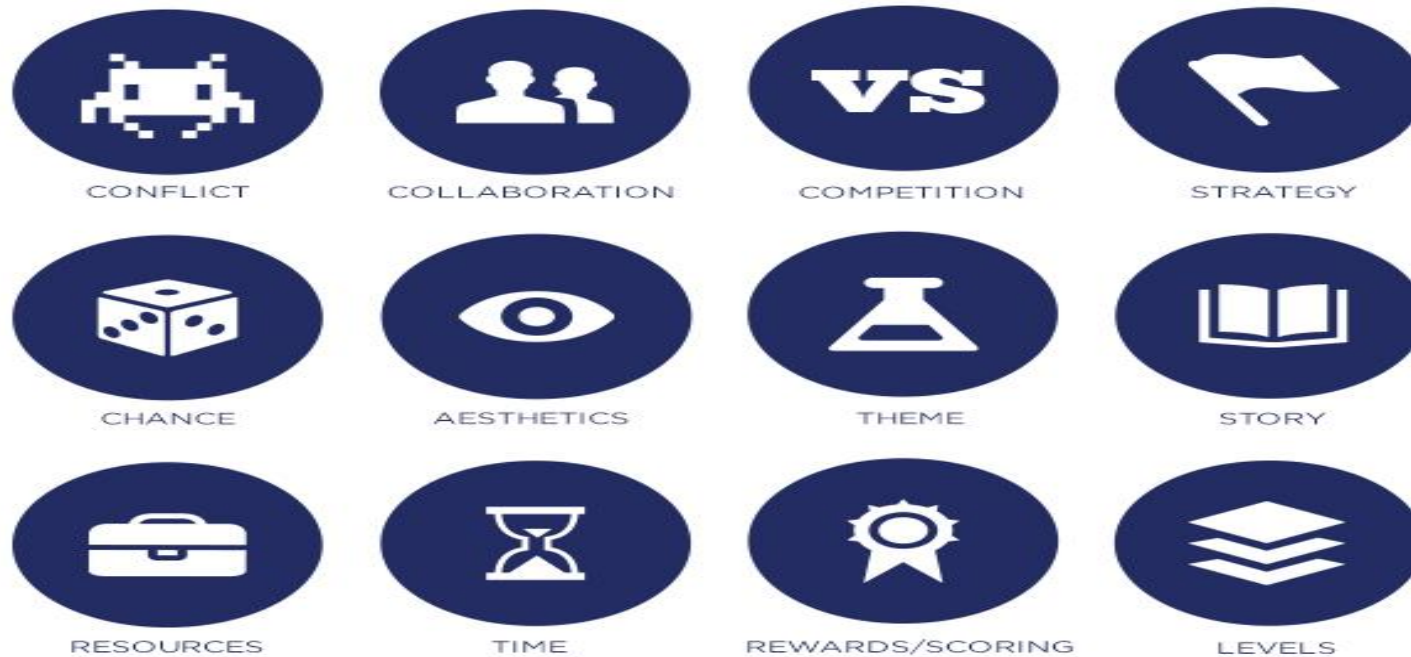
Bradbury (2017)

- Game-based learning uses learning games to achieve an instructional goal.
- Game-based learning involves an actual game that helps people learn. Players will either know something or be able to do something as a result of playing the game.
- Gamification design frameworks do use game design principles but the purpose of the design is different

# Definition of terms: Gamification

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Gamification refers to the use of game design elements in non-game contexts (Bradbury, 2017). Its purpose is to enhance engagement in different contexts. 12 commonly used elements:



# Studies on gamification in learning

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A study of 91 papers using quantitative methods by Majuri, Koivisto and Hamari (2018):

- 65 papers showed positive results
- 23 papers showed mixed or null results
- 3 papers showed negative results

## **Outcomes studied in the papers:**

### *Affordances*

- Achievement/progression
- Social
- Immersion
- Non-digital elements

### *Psychological outcomes*

- General attitude towards the use of the system
- Affective
- Cognitive
- Experienced challenge
- Attitude
- Social interaction
- Personality features

### *Behavioural outcomes*

- Performance
- Engagement/interaction with the system
- Physical measures
- Social interaction

# Gamification design frameworks

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Design frameworks (Mora, Riera, Gonzalez, & Arnedo-Moreno, 2015)

- **Di Tomasso** (2011) – based on self-determination theory. Steps: discover the reason to gamify, identify players' profiles and motivational drivers, set up goals and objectives, describe skills, track and measure; define lenses of interest, desired outcomes, play-test, and polish.
- **Werbach and Hunter** (2012) – 6Ds (**D**efine business objectives, **D**elineate target behaviour, **D**escribe your players, **D**evisе activity loops, **D**on't forget the fun and **D**eploy appropriate tools)
- De Paz (2013) – set up the business goals, determine the basic design and use of game elements; implement and maintain the system using metrics.
- Yu-Kai Chou (2013) – Octalysis – human motivation is key in gamification (human vs functional focused design). 8 core drives: epic meaning and calling, development and accomplishment, creativity and feedback, ownership and possession, social influence and relatedness, scarcity and impatience, unpredictability and curiosity; loss and avoidance.

# Learners' profile

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- SIT is Singapore's fifth autonomous university.
- Established in 2009, gazetted as a university in March 2014
- Applied learning / industry-focused university. Degree programmes are grouped into five clusters – Engineering (ENG), Chemical Engineering and Food Technology (CEFT), Infocomm Technology (ICT), Health and Social Sciences (HSS), as well as Design and Specialised Businesses (DSB)
- Caters primarily to polytechnic graduates. Most of the students need help in communication skills and grammar.



# Rationale for English Quest

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1. Students have gone through nearly 20 years of education in English as a first language and do not want more grammar instruction in a classroom setting
2. English entrance tests to identify the students with the weakest English proficiency tends to leave students feeling stigmatized
3. Students need help in grammar for their writing assignments but do not seek help
4. Grammar is too dry to be taught as a subject, even if curriculum time allows (which is rare)

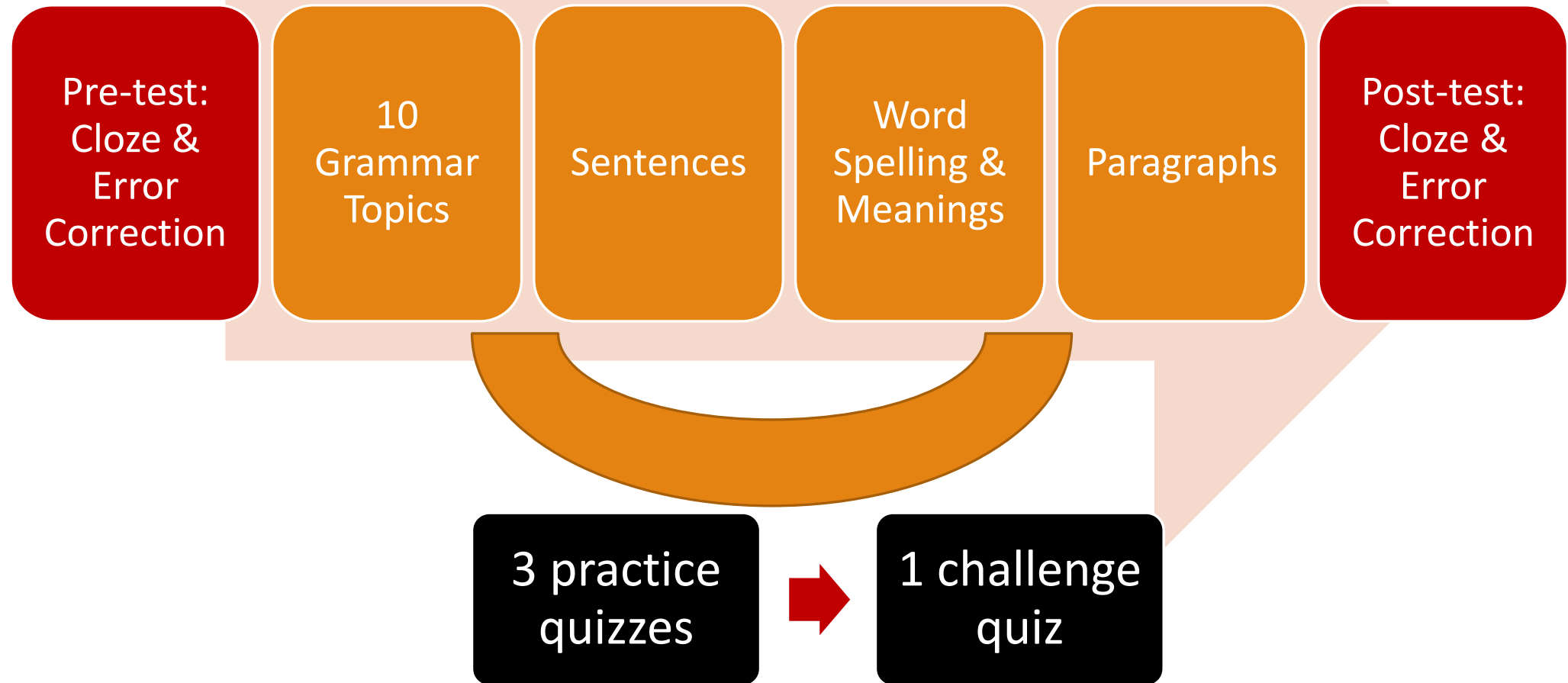


# Solution: English Quest

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- An online supplementary/enrichment gamified application for students to improve their skills in grammar, sentence structure, word usage and paragraph construction on their own time
- Hosted in institutional learning management system (no extra cost incurred, technical issues handled by institutional team)
- As it is a learning tool, it has to allow for tracking of students' results, even if it is not graded.
- Trailer: [https://drive.google.com/open?id=1b7on\\_QU0drqW94IJTAnqdW4ikppbj40L](https://drive.google.com/open?id=1b7on_QU0drqW94IJTAnqdW4ikppbj40L)

# English Quest: Content



# Gamification design (initial plan)

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- Landscape of an island with 4 themes (grammar; sentences; words and spelling; and paragraphs)
- Storyline of edventurer going on hunt for treasures or points
- Rewards/scoring: progress bar, badges
- Competition: Leaderboard, timer
- Resources/feedback: Three tries in a practice activity before feedback is given, bite-sized notes

## Problems encountered

- The file was too huge in size, causing long loading time in the LMS
- The LMS could not capture scores for the practices and challenges as one SCORM file could capture only one score



# Gamification design (realized plan)

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- Themes remain but as bite-sized SCORM packages
- Progress bar
- No timer – too stressful to learn; more fun, less competition
- Interactive practice and challenges. Only the score for the challenge is captured.
- Instant feedback
- Educational micro notes
- Valuable resources

# Blessing in disguise!

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## Scalability (Farias, 2019)

- A system is considered scalable when it doesn't need to be redesigned to maintain effective performance during or after a steep increase in workload. It reflects the ability of the software to grow or change with the user's demands.
- Advantages
  - If there are more users in the future and changes in learners' needs, the product is lean enough to still meet learners' needs without adding complexity to the system.
  - Staff won't need much training or persuasion to adopt that upgraded system.

Reusability – can be repackaged in whichever way we want across full or embedded modules, helpdesk etc.

# English Quest

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## History of user testing

- 15-26 Feb 2018 – tested by CCS team of 6 ppl
- 6-11 March 2018 – user acceptance testing by paid 14 student helpers – survey and focus group discussion, feedback sent to vendor for troubleshooting, some revisions done internally
- 26 March 2018 – EQ commissioned
- 21 May – 24 June 2018 – EQ rolled out to 3 modules as an ungraded enrichment module (259 students)
- English Quest rolled out as widget to other modules (appears by default in all CCS modules) as enrichment material

## Tri 2 AY2018 English Quest rolled out as graded assignment in CCS writing modules

- Modules: Accountancy, Civil Engineering, Pharmaceutical Engineering, and Chemical Engineering (218 students)

# User acceptance testing of pilot version of EQ

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Questions were adapted from Berns et al's (2016) technology acceptance survey which focuses on the experiences of learners and their evaluation of the app as a language learning tool:

## **Focus group interview questions**

1. How was your experience with English Quest in terms of content and design?
2. How was your experience with English Quest in terms of usefulness?
3. How was your experience with English Quest in terms of interaction?
4. How was your experience with English Quest in terms of ease of use?
5. How was your experience with English Quest in terms of it being a learning tool?

# Responses by theme

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# Content

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1. Content rather **useful**. Not **overwhelming**. Interesting. Some parts were a bit **humorous** – names used.
2. Overall, I find that the content is great. The questions are **doable** and the examples used are very **educational**.
3. By attempting the English Quest, it helps to **refresh** my memory on basic English functions such as proverbs, adjectives and much more. It also helps to improve my thinking skill, forcing me to **think through** to figure out the right answer.
4. It helps to **strengthen my foundation** in English. Even though I have already learnt and understand the English basics, but it was years ago. And with the lack of proper writing and speaking of English, I may have forgotten some of the basics and may have misused them. This exercise helped to correct those mistakes and further improve my command of English.
5. In terms of content, I think it is fine as the questions are **all short & sweet**. It was pretty useful as it covers the basic grammar contents like nouns & pronouns.
6. I find the English Quest a great platform for students to correct and improve their English. The plus point would definitely be that it is **separated into different categories** so user can pick which topic they are weak in and practice more. My suggestion is to add **more practices** to each topic as three practices is definitely not enough if the user is weak in that particular topic.
7. Have two packages – 1 (basic) and 2 (intermediate). Have the option to **level down** if you find it too difficult at one level.

# User interface design

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1. Overwhelmed to see so many practices to do after the pre-test. Suggest that show practice 1 for each part of speech and then open up practices 2 and 3. Need to know what is required upfront.
2. Test has to be completed at least 80% before allowed to see posttest.
3. Screen size of laptop was too small, needed to keep scrolling. Passage was too chunky.
4. Have avatar names rather than real name – otherwise, if they know that someone is good in English they will be asked to write reports next time.
5. Maybe have a 'proceed to next topic' and 'proceed to next practice button' at the bottom instead of having to go to quiz list each time I want to pick a new topic/practice.
6. 10 questions per quiz is fine – something that can be finished fast at the bus stop.
7. Overarching story – e.g. kill the boss. If you kill the boss, no need to do the rest of the quizzes.
8. Can save the progress of a quiz so that can pick up the same quiz again later.
9. 44 quizzes is a lot of work. Students who are more proficient need not complete everything, they could go to challenge quizzes. Students who are less proficient need to hit a certain score in the practice quizzes before they can go to challenge quizzes.
10. Playing against a friend in real time?

# Perceived usefulness

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1. More prone to use **Google** than read micronotes.
2. I think it would be great for those practices that provide the right answers after each attempt, to **explain why that is the right answer** instead of the answer chosen by user. That way, the user will learn instead of just memorizing what the right answer should be. If it is too tedious to explain every option, we could have a statement to **refer the student** to paragraph x of the micronotes.

# Perceived interaction

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1. **Instructions need to be clearer** on what and how to answer the error detection task
2. Give a **correct and incorrect example** on how to fill-up the blank in the error detection task in the pre and posttest.
3. Videos or photos can be added into English Quest. **Visual explanation** will aid the students to better understand the content.
4. **Timer not needed** – too stressful.
5. If EQ is meant as a refresher course, then **there is no need to know how you fared in relation to peers** in terms of grade.
6. Have a **summary** of their performance (how they fared in relation to their peers) consolidated in a graph or chart for each section - Wrong and correct answer (score) and overall score
7. **Progress bar** (tasks completed, not completed, percentage completed) or check (tick) for each section completed or change in icon e.g. a dot for task not attempted and then change to a tick when the task is completed
8. Have the option to **skip** reading the micronotes.

# Ease of use

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It is easy to use, very straight-forward.

# Learning tool

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1. Through this platform, many of my small grammar and punctuation mistakes was corrected. Now, I know better so this platform is definitely **useful** in terms of being a learning tool.
2. It help me with my writing, **I take notice** of my tenses, grammar and punctuations more now.
3. Leaderboard – include **level up** feature. Do not have basic, intermediate and advanced – students feel that they are being streamed. After each quiz – have score, certain XP or bonus points, have goal for what the leveling is for in line with storyline (hit milestones), achievement titles beside their avatar names like English master, English knight, etc. Use the **number of attempts to get more points to level the playing field** between the advanced and weaker students.
4. Should **not have leaderboard** – the purpose of EQ is for learning and not competition.
5. Students who are already proficient in English should not be allowed to take the Quest or **should not be part of the leaderboard**.

# Technology acceptance survey (mean rating) N=14

User interface design	Perceived usefulness	Perceived interaction
<ul style="list-style-type: none"><li>• The layout or design for English Quest was easy to use (4.07)</li><li>• The interface makes it easy to find information I need (4.36)</li><li>• The interface makes it easy to read and understand the information (3.29)</li><li>• In general, I am satisfied with the design of the interface (3.71)</li></ul>	<p>English Quest was useful for learning grammar items (4.36)</p> <p>English Quest was useful for learning how to construct proper sentences (4.29)</p> <p>English Quest was useful for learning the spelling and meaning of words (3.86)</p> <p>English Quest was useful for learning about how to write proper paragraphs (4.00)</p> <p>English Quest was useful in helping me improve my overall language skills (3.93)</p>	<p>English Quest provides sufficient choice for me to plan my learning (3.57)</p> <p>English Quest provides sufficient information on my learning progress (3.21)</p> <p>English Quest provides clear instructions on what I need to do (3.93)</p>

# Technology acceptance survey (mean rating, N=14)

User interface design	Perceived ease of use	Learning tool
The layout or design for English Quest was easy to use (3.86) The interface makes it easy to find information I need (3.43) The interface makes it easy to read and understand the information (3.71) In general, I am satisfied with the design of the interface (3.50)	English Quest is easy to navigate (4.21) English Quest facilitates easy keying-in of answers (3.86) English Quest facilitates easy checking of answers (2.43)	English Quest is a good learning tool to learn grammar by myself (4.14) English Quest is a good learning tool to learn sentence construction by myself (4.07) English Quest is a good learning tool to learn vocabulary by myself (3.93) English Quest is a good learning tool to learn how to write paragraphs by myself (3.93)



# Lessons learnt

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- Partnership in content development with vendor is important – communicate often
- Start testing early, in batches
- Failures could turn out to be a blessing in disguise. Keep learning and improving
- Include students in the development process - They know what they want and can be very specific about it. Do not justify anything, just listen to them and they will open up
- Start the journey as an enrichment tool (low stakes) and improve the app with each iteration

# References

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